March 5, 1963 P. H. LINDHGREN 3,080,204

STORAGE APPARATUS

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Fig. 1.

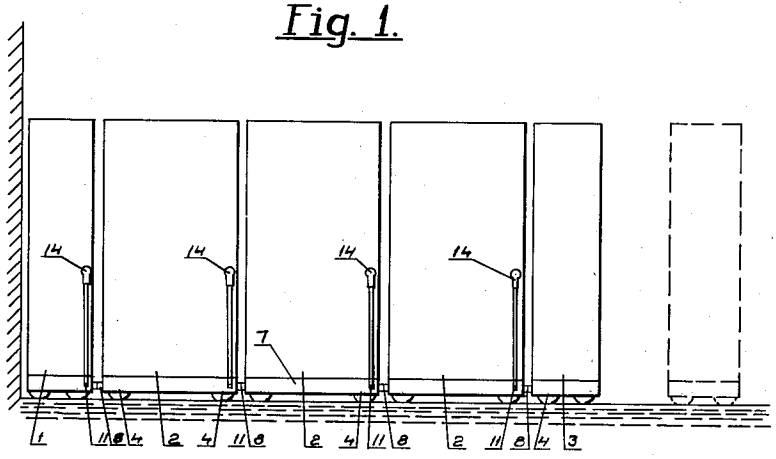
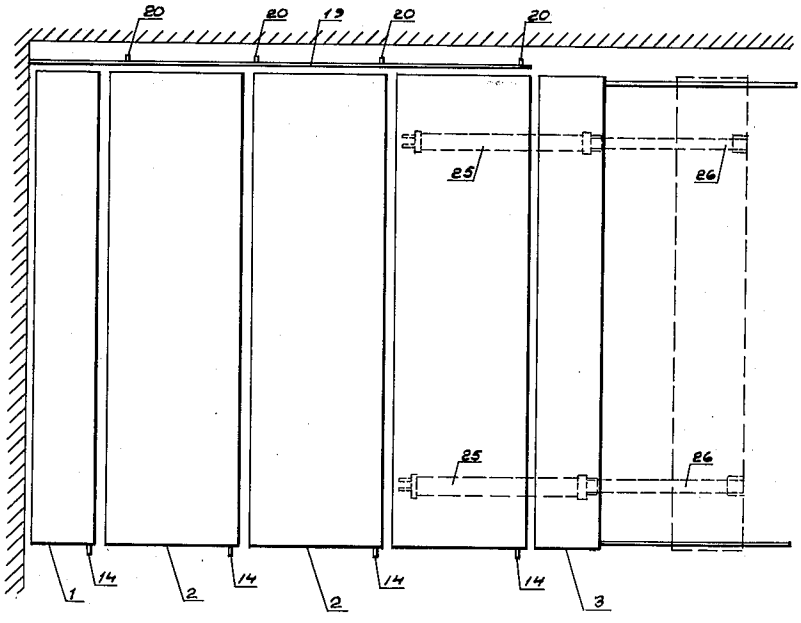


Fig. 2.



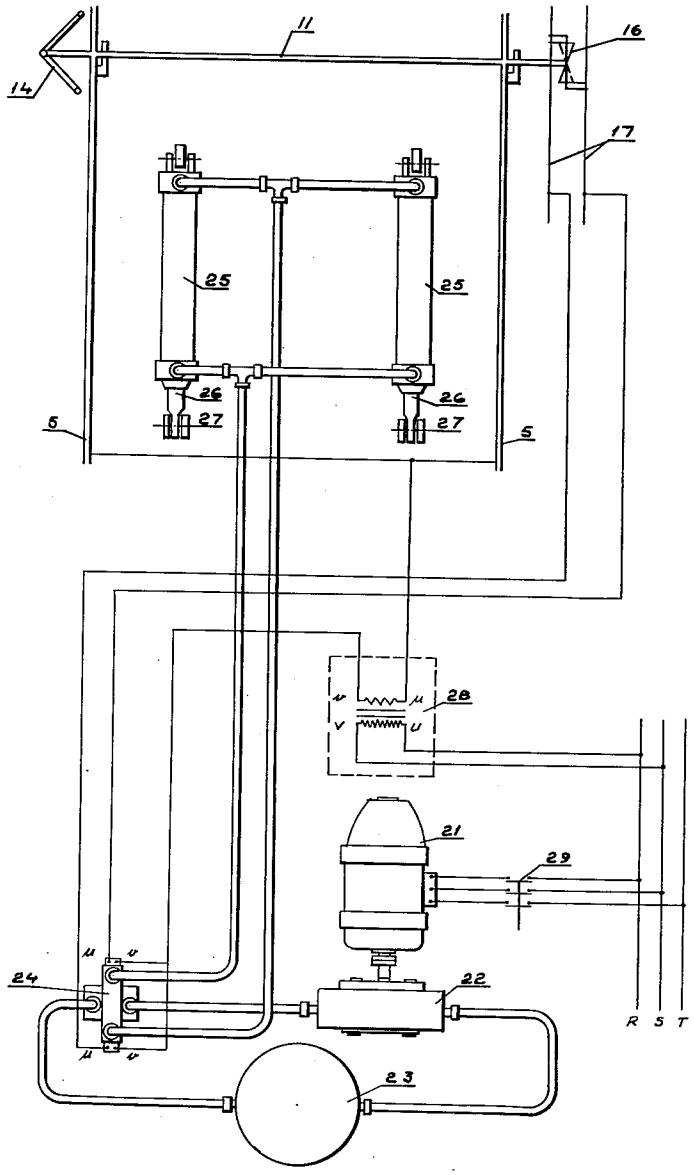
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Fig. 3.



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Fig. 4.

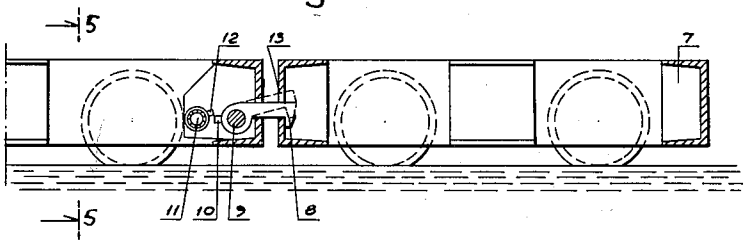
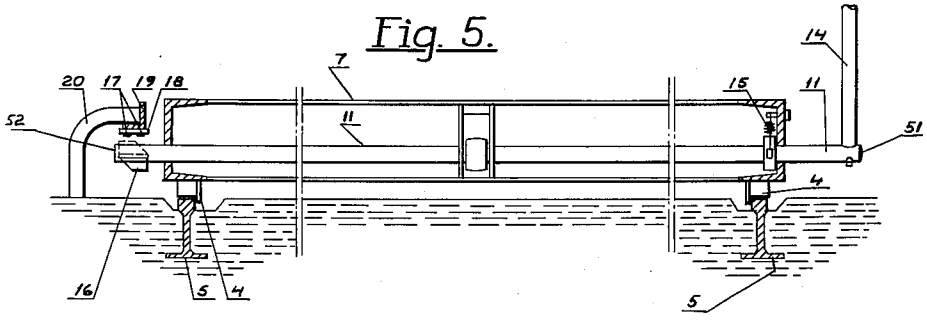


Fig. 5.



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Fig. 6.

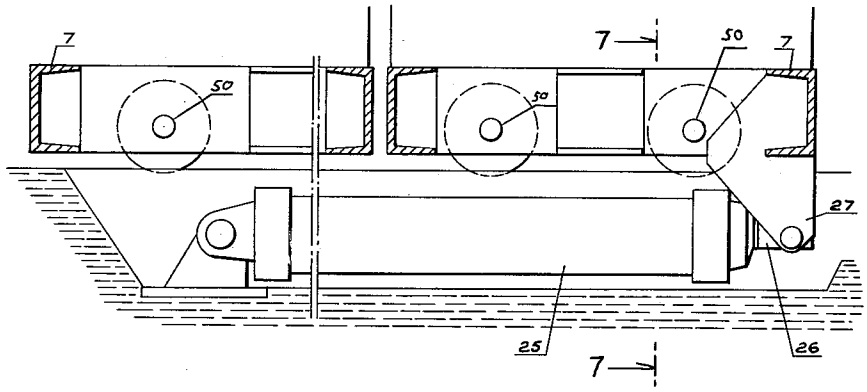


Fig. 7.

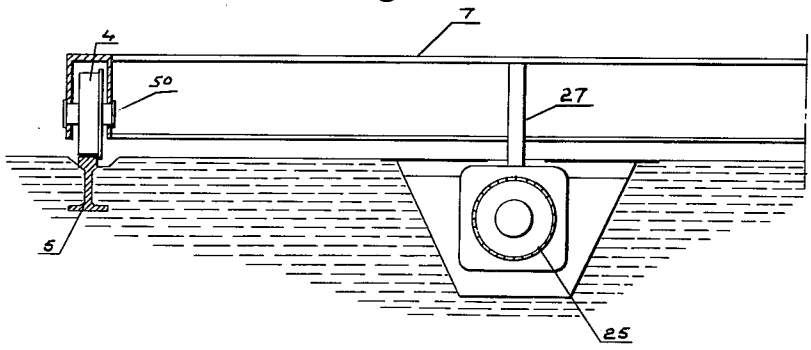
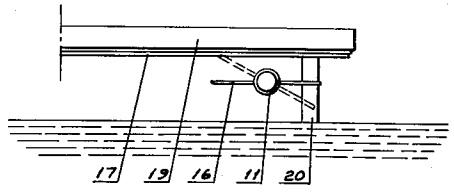


Fig. 8.



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3,080,204

STORAGE APPARATUS

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7 Claims. (Cl. 312—199)

This invention relates, in general, to storage devices, and, more particularly, to laterally displaceable shelf stands or boxes which are moved apart to gain access to objects stored within them.

A main feature of this invention is to provide storage boxes or shelf stands which are arranged in a row and carried by wheels or rollers. The shelf stands are provided with manually operable means for coupling together adjacent shelf stands in the closed position. One of the end stands in a row is connected with a drive means which is adapted to move the endmost stand toward or away from the row. This motion of the endmost stand slides apart two chosen shelf stands after coupling means between the selected two stands has been released.

Many other features, objects and advantages of this invention will become apparent in the following description and accompanying drawing wherein:

FIG. 1 is a front elevation of a row of shelf stands;

FIG. 2 is a top view of the row of shelf stands;

FIG. 3 is a schematic drawing of the drive means which displaces an endmost shelf stand in a row;

FIG. 4 is a longitudinal vertical section through the bases of one shelf stand and a fragment of an adjacent shelf stand;

FIG. 5 is a transverse vertical section taken on line 5—5 of FIG. 4;

FIG. 6 is a longitudinal vertical section through a hydraulic drive means and the two endmost bases of two shelf stands;

FIG. 7 is a transverse vertical section taken on line 7—7 of FIG. 6; and

FIG. 8 is a side view of a contact member and two conductor strips mounted on a bracket.

Referring to the drawing in detail, the numerals 1, 2 and 3 designate shelf stands or boxes for accommodating documents, files, books, or other records or objects. The shelf stands 1, 2 and 3 are mounted on wheels or rollers 4 running on the rails 5 which are mounted on or embedded in the floor. When rollers are used, they may be used without the rails 5.

The base of each shelf stand 1, 2 and 3 consists of a rectangular frame structure 7 made of channel iron with an angular U-shaped cross section. The wheels 4 are mounted on the axles 50 which are rotatably journalled in the sides of the frames 7. Pivoted about a short shaft fixed to one longitudinal side of frame 7 is a pawl 8 which has a projection 10 projecting inwards within the frame 7. An axle 11 extends transversely across each frame 7 and has its ends extended beyond the sides of each frame 7. Each axle 11 is disposed near and parallel to a shaft 9. A short arm is fixed to axle 11 and arranged to strike the projection 10 on a pawl 8 when the axle 11 is rotated through a given angle towards the pawl 8. As the arm 12 strikes the projection 10, it rotates the pawl 8.

Each pawl 8 is adapted to enter an aperture 13 in an adjacent frame 7 to couple the shelf stands together. The end portion 51 of each axle 11 extending beyond a shelf stand is provided with an upwardly directed operating lever 14. Thus the movement of an operating lever 14 to the right, as shown in FIG. 1 or 4, will rotate a shaft 11 to disengage a pawl 8 from the frame 7 of an adjacent shelf stand.

The axle 11 is restrained in its rotation by a spring 15, as shown in FIG. 5, to automatically return a lever 14 to

an upright position when it has been swung to one side or the other and then released. Rigidly fastened to the end portion 52 of each axle 11 is a contact member 16 which is adapted to close a circuit with one of the conductors 17 when the axle 11 is rotated. As shown in FIGS. 5 and 8, the conductors 17 are fastened to the lower side of a flat plate 18 of a non-conducting material. The plate 18 is fixed to the lower side of a bracket 19. The bracket 19 and the plate 18 are positioned along the side of a row of shelf stands by supports 20 which are fastened in the floor.

The movement of the shelf stands is effected by means of a conventional electric motor driven hydraulic unit. This unit, as shown in FIG. 3, consists of an electric motor 21 driving a hydraulic pump 22. Pump 22 is connected to a liquid reservoir 23. An electrically controlled liquid distributing valve 24 directs pumped fluid to extend or retract the piston rods 26 of the two hydraulic cylinders 25.

As shown in FIGS. 6 and 7, the hydraulic cylinders 25 are located in excavations under the endmost shelf stand of the row. The piston rods 26 of the cylinders 25 are connected to the drive members 27 which are fastened to the frame 7 of the endmost shelf stand. The outward movement of the piston rods 26 in the cylinders 25 moves the endmost shelf stand 3 away from the end of the row to the right as shown in FIG. 6.

Referring further to FIG. 3, the electric conductors 17 are connected to two terminals on valve 24. Current is also directed to valve 24 from the low voltage winding of transformer 28. The low voltage winding of transformer 28 is also connected to the rails 5. Thus, depending on which conductor 17 is contacted by a contact element 16, low voltage current will be carried to given connections on the valve 24 to cause it to extend or retract the piston rods 26 of the cylinders 25.

Each shelf stand 1 and 2, but not shelf stand 3 which is connected with the piston rods of the hydraulic cylinders 25, is provided with an axle 11 and an operating lever 14. When an operating lever is moved to the right, as shown in FIG. 1, the pawl of that shelf stand is released from the adjacent shelf stand and the contact member 16 simultaneously closes an electric circuit to cause the valve 24 to direct hydraulic fluid to extend the piston rods 26 from the pistons 25 and thereby move shelf stand 3 to the right drawing and pulling along any shelf stands which may be coupled to it and behind it.

The electric motor 21 may be started simultaneously by means of a solenoid switch 29 which has its activating coil (not shown) connected through the conductors 17 to the low voltage winding of transformer 28 which activates valve 24. Thus it may be seen that, as shelf stand 3 moves to the right, all the shelf stands, if any, coupled behind it will be drawn to the right to pull apart the shelf stands by that lever 14 which was moved to the right.

When this operating lever 14 is later moved to the left, the contact member 16 sends current through the other conductor 17 activating valve 24 to retract the piston rods 26 into the cylinders 25. This moves the shelf stand 3 to the left to push the other shelf stands toward each other into a closed position. When parted shelf stands are pushed together, they are automatically coupled by a pawl 8 entering an opening 13 of an adjacent shelf stand. When the operating lever 14 is let loose after the actuation of the shelf stands, it is moved to an upright position by the spring 15. This disengages the contact member 16 from either of the conductors 17.

While this invention has been described in the best form known, modifications may be made without depart-

ing from the spirit of the invention except as it may be more limited in the appended claims wherein I claim:

1. In a storage device, shelf stands having wheels or rollers supporting said shelf stands in a row, said shelf stands being longitudinally disposed at right angles to the direction of the row of said shelf stands and being displaceable in the direction of said row, coupling means adapted to couple adjacent shelf stands together when adjacent shelf stands are urged together into a closed position, a hydraulic unit connected to one of said shelf stands located at the extreme end of the row, power means driving said hydraulic unit to selectively displace the shelf stand connected to said hydraulic unit in a direction along said row of shelf stands, manual control means on each of said shelf stands being moveable to a first position and a second position in which said manual control means disconnects said coupling means between two of said shelf stands, and means responsive to the manipulation of any one of said manual control means, said means responsive to the manipulation of any one of said manual control means activating said power means to drive said hydraulic unit which moves said shelf stand located at the end of said row outward away from said row when any one of said manual control means is moved into the second position and said means responsive to the manipulation of said manual control means activating said power means to drive said hydraulic unit which then moves said shelf stand located at the end of said row inward toward said row when any one of said manual control means is moved into the first position.

2. The combination according to claim 1 wherein said coupling means comprises a pawl rotatably secured on each shelf stand and wherein each shelf stand has a portion engaged by a pawl of an adjacent shelf stand.

3. The combination according to claim 2 wherein said hydraulic unit comprises at least one hydraulic cylinder having one end which is connected to a shelf stand at the extreme end of said row, and wherein said power means driving said hydraulic cylinder comprises an electric motor, a hydraulic pump driven by said motor, and an electrically operated four way valve disposed between said hydraulic pump and said hydraulic cylinder, said means responsive to the manipulation of any one of said manual control means operating said four way valve.

4. A storage device comprising, in combination, shelf stands having wheels or rollers supporting said shelf stands in a row, said shelf stands being longitudinally disposed at right angles to the direction of the row of said shelf stands and being displaceable in the direction of said row, a pawl pivotally secured to each shelf stand, each of said shelf stands having a portion adapted to be engaged by a pawl of an adjacent shelf stand when adjacent shelf stands are urged together into a closed position, at least one hydraulic cylinder connected to one of said shelf stands at the end of said row, an electric motor, a hydraulic pump driven by said electric motor, an

electrically actuated four way valve connected between said hydraulic pump and said hydraulic cylinder, manual control means on each of said shelf stands being moveable to a first position and a second position in which said manual control means rotates and disconnects the pawl engaging an adjacent shelf stand, means providing current to activate said four way control valve, and switch means connected between said means providing current and said four way valve, said switch means activating said four way valve so that said hydraulic cylinder moves said connected shelf stand at the end of said row outward away from said row when any one of said manual control means is moved into the second position and so that said hydraulic cylinder moves said connected shelf stand at the end of said row inward toward said row when any one of said manual control means is moved into the first position.

5. The combination according to claim 4 with the addition of means supplying line current to said motor, and wherein said means providing current to activate said four way valve comprises a transformer connected to said means supplying line current, said transformer providing low voltage current.

6. The combination according to claim 5 wherein said manual control means on each shelf stand comprises a shaft longitudinally journaled across each shelf stand, a lever projecting vertically upward and fixed to each of said shafts, each of said levers being movable toward and away from the direction of said hydraulic cylinder at the end of said row, an arm on each of said shafts which engages and rotates a pawl disconnecting an adjacent shelf stand when the lever fixed to each shaft is moved towards said cylinder, said switch means being activated by the rotation of any shaft so that movement of any lever toward said cylinder activates said cylinder moving said shelf stand connected to said cylinder outward away from said, row and movement of any lever away from said cylinder activates said cylinder moving said shelf stand connected to said cylinder inward toward said row.

7. The combination according to claim 6 with the addition of spring means urging each of said levers into a vertical position.

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